THE FARM INDEX
U.S. Department of Agriculture May 1976

Farming Minus the Plow

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Outlook

The 1976 crops in the U.S. should do okay if the pesticide picture is any indication. Pesticide supplies this year as well as next are termed "ample" by the ERS people keeping tabs on the situation. That goes for nearly all products.

Total pesticide output this year will mount by an estimated 10-15 percent. Herbicide production is slated to increase about 14 percent from a year ago and insecticides by about 18 percent. But fungicides won't change much.

Total pesticide supplies, however, could grow by as much as a fifth over 1975 levels due to the large inventories at the start of 1976. Insecticide supplies are seen around 30 precent above last year . . . herbicides 15-20 percent greater . . . fungicides about the same as in 1975.

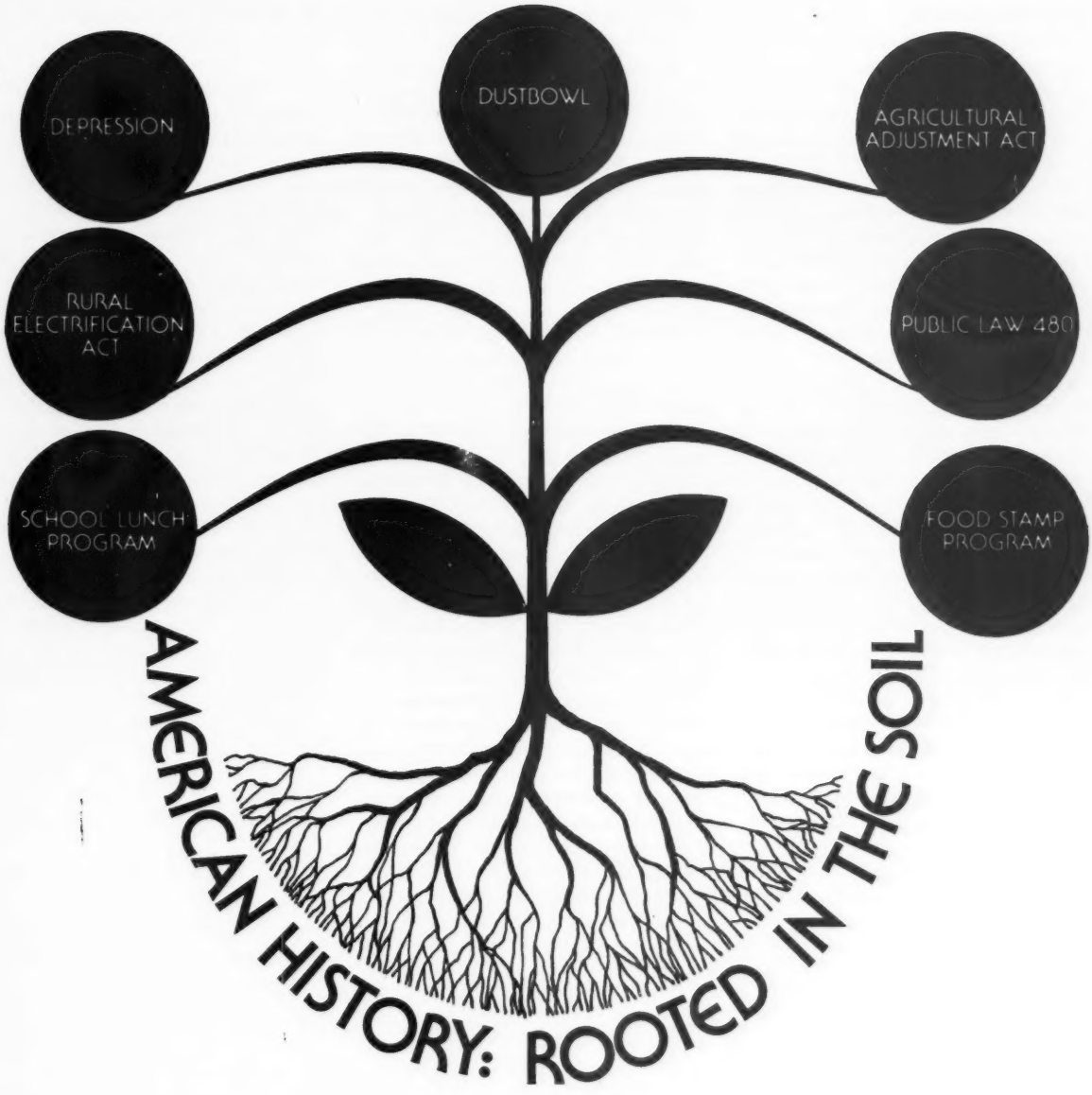
More cheery news in the outlook is the prospect of leveling pesticide prices. Though prices paid by distributors are reported 5-10 percent over 1975, retail list prices have risen less than 5 percent, and early prices paid by growers have even gone down in some cases.

Overall it's shaping up to be a good year for pesticide manufacturers, with total sales for the 1976 growing season expected to be up 10 percent over 1975.

A note on pesticide regulations: They will become increasingly important in planning pest control programs. Among the key changes in the 1975 regulations were the extension by Congress of The Federal Insecticide, Fungicide, and Rodenticide Act, and the suspension of certain uses of chlordane and heptachlor by the Environmental Protection Agency (EPA). During the next 18 months, growers who intend to apply "restricted use pesticides" must get certification from the EPA.

How about 1977? No problems apparent on the supply side. Manufacturers continue to add to production facilities. Capacity is expected to expand 10-15 percent this year, and another 5-10 percent in 1977.

Farther down the road, ERS sees some slackening in pesticide production and use during 1978-80. A chief reason is that nearly all of the acreage—80 or 90 percent—in corn, soybeans, cotton, and spring wheat is already being treated with herbicides, so the rise in demand won't be as large as in recent years.



Part III

Land of Plenty

The land lay naked before the plow by 1930. Its camouflage of wilderness had been cleared, and its Indian allies fought no more. Farmers were too busy to listen to the few voices of warning. This last story of a special 3-part series relates the land's great rebellion, and the struggle for abundance that followed.

The wind began to howl in a steady, unnerving pitch across the Great Plains in the 1930's.

Anxious farmers kicked the dry dirt. Even in an area that expected little rain, it was the worst drought yet.

Then, the winds scooped up the dust and the dreams of men and flung them hundreds of miles.

Some called it the "dustbowl," but Plains farmers called it the end of a dream.

Dire warnings of soil conservationists had been ignored while the soil produced abundant crops, on land endlessly plentiful.

Grasslands had been overgrazed and farmland had been overplowed. There was nothing to keep the Great Plains soil from the grasp of the wind.

The rich prairie topsoil blew 2,000 miles to the East Coast, choking Easterners, blotting out the sun over the Nation's Capitol.

Legislative flurry. In a dusty haze, Congress quickly passed many additional laws to protect forests on public and private lands, to protect grazing lands, to buy some submarginal lands from private owners and revegetate them, to protect watersheds and other vulnerable resources, and to give farmers incentives for using soil-conserving practices on their lands. In short, long-ignored land use principles were made law.

The 1920's and 1930's were years of crisis for American agriculture. Out of that crisis grew wiser, more thoughtful practices that helped make the modern abundance possible.

For more than 3 centuries, agriculture had been expanding as an economic force. Steadily, the number of farmers, the amount of land under cultivation, and the total agricultural production grew.

Production and demand were seldom in balance but the steady growth of demand made periods of surpluses relatively short.

Farming influence. Farming had served not only as the Nation's economic backbone, but also as a "carrot" to lure settlers ever westward to tame the land, and as a strong influence on the philosophy and cultural heritage of the Nation and its leaders in early days.

But in 1920, a dark era for agriculture began with a lessening of demand for farm products. World War I had depleted Europe's financial resources, and, in turn, its ability to buy American food and fiber. The European nations sought to conserve foreign exchange by encouraging domestic food and fiber production. This caused a disastrous price drop for American farmers.

Farming had become increasingly commercialized since 1900. More and more, farmers went to the market place for goods they once provided themselves—farm machinery, seeds and other production supplies, as well as for items used in the home. The days of pioneer self-sufficiency were long past.

Price squeeze. As agricultural product prices dropped in the 1920's, nonagricultural prices and wages remained stable or increased, creating severe hardships for farmers.

Aware of these hardships, U.S. Senators and Representatives from farm States then formed a "Farm Bloc" in Congress to seek legislation to help farmers.

The Farm Bloc encountered much opposition. But it managed to pass legislation designed to ensure that farmers received fair treatment in the marketplace, to encourage farmer cooperatives, and to provide loans when disaster struck.

Finally, in 1929, a revolving $500 million fund was provided for loans to cooperatives to stabilize farm prices. The Federal Farm Board, established under this legislation, worked well with cooperatives. But its resources were inadequate, especially when the Great Depression came.

Federal intervention. Other ideas for Government intervention evolved. Since 1921, several plans suggested variations of a two-price system. Higher prices would go to farmers for

Ignoring the warnings of soil conservationists, this farmer left no cover on his land to keep it from blowing. Rows running north and south are easily scooped by the rampaging north wind.

those parts of their crops consumed in the U.S., while the rest of the crops would be exported at world market prices. One such plan, the McNary-Haughen Plan was twice passed by Congress, but vetoed by the President.

Then, in 1933, hard on the heels of the Nation's Great Depression that decimated agriculture along with everything else, Franklin D. Roosevelt and his new Congressional majority took office. Congress enacted the Agricultural Adjustment Act (AAA), which included a two-price variation. Another AAA provision gave the Secretary of Agriculture power to reduce acreage or production by voluntary agreement of producers, and to enter into marketing agreements with processors and others to support prices. Farmers would receive rental or benefit payments and USDA could spend money to expand markets or remove surpluses.

Roosevelt's plans. The Roosevelt legislative deluge continued. With the farm credit system broken down during the Depression, Congress passed an Emergency Farm Mortgage Act and the Farm Credit Act. The Farm Credit Administration was established to handle emergency and long-term programs.

The aim of all of this legislation was to restore the financial stability of the average farmer, and to help get rural America back on its feet after staggering setbacks.

Other programs arose to relieve the destitute farm families that were hardest hit by the Depression. The Farm Security Administration was created to administer such programs.

Lighting America. Some rural programs provided far more than temporary relief. The Rural Electrification Administration was established in 1935 to provide jobs and to extend electric power lines into the countryside. The success of the program sparked the Rural Electrification Act of 1936 to bring light to farm homes, by aiding cooperatives in providing such technological improvements. By 1960, 97 percent of all farms had electrical service.

In taxing processors to help farmers, the administration went too far, according to the U.S. Supreme Court. In 1936, the Court invalidated production control. But Congress quickly passed the Soil Conservation and Domestic Allotment Act to shore up the court-weakened AAA.

The programs began to take root. In 1935, farm income was 50 percent higher than the 1932 level, and farm prices steadily gained.

More legislation. Still more legislation followed: the omnibus Flood Control Act, the Norris-Dovey Farm Forestry Act, and the Agricultural Adjustment Act of 1938. The latter act established an "ever-normal granary" plan of balanced abundance, with loans secured by commodities that were placed in storage by farmers, acreage allotments, and marketing quotas. The goal was "parity" prices and income for farmers.

The New Deal's agricultural philosophy was based on the assumption that the Depression was a crisis of underconsumption rather than overproduction. The Federal Government acquired large stocks of farm products until the middle of World War II and distributed large amounts of food free to the unemployed and for school lunch programs. Programs to provide nourishment for the hungry eventually led to the Food Stamp program. Similar plans were used to distribute cotton.

Agricultural research. In the Agricultural Adjustment Act of 1938, research into new uses for agricultural products was authorized, and four regional laboratories were established. Over the years, these laboratories have contributed processes for mildew and flame proofing of cotton fabrics, permanent press cottons, shrink resistant woolens, plastics and glue from soybeans, improved processes for dehydration, freezing and freeze-drying of foods, food preservation by irradiation, and many other production methods that are widely used.

Legislation encouraged still other research in economics, land use, genetics and other areas that aided recovery from the farm depression. The 1930's was the period when USDA Extension was expanded to reach virtually every county in the U.S. and the average farmer became receptive to scientific knowledge even though he could not afford to try out the new ideas.

New day lurks. Lurking behind the disastrous Depression was the means to a great new day in agriculture: mechanization. In the bad years, farmers were reluctant to try innovations that required large investments. Although tractors and other improved equipment were available, farmers continued to use horses. In 1940, the average age of reapers was 17 years.

The same reluctance also applied to hybrid seeds, fertilizers, and pesticides. The means to attain great productivity increases were available, but a period of high prices was required before farmers would invest in the new methods.

Prices jumped in World War II, but wartime scarcity of materials forced many farmers to defer changes until after the war.

Commercial farming. Then, the "second American Agricultural Revolution" blossomed with the complete commercialization of many farms. The commercial farmer became increasingly specialized. Most of the foods and fibers used in farm homes were bought at the marketplace, rather than raised in diversified farms. Hired labor was replaced by machines where possible.

With these changes, the farmer needed more cash. He could achieve this by increasing production through cultivation of more acreage. By the 1950's farmers were saying they had two choices: expand or go out of business. Many chose the latter course, and the farms were absorbed by neighboring farmers who were expanding. In 1940, 6 million farms averaged 167 acres each. By 1975 only 2.8 million farms were operating, with an average of 385 acres each.

Yields explosion. The first agricultural revolution resulted from great improvements in labor productivity through new tools and horse-drawn machinery. The second agricultural revolution not only made

possible greater labor productivity gains through fuel-powered machinery, but also permitted astonishing increases in land productivity through application of plant and animal research breakthroughs and new chemicals. This has been called the "yields explosion."

During and just after the war, farmers received good prices. In war years, price supports were set at 90 percent of parity (ratio of prices received to prices paid in 1910-1914) to spur production. Price ceilings for many commodities were 110 percent of parity.

When wartime legislation expired 2 years after the war, the level of price supports became a major political issue, dividing farm organizations, economists, and politicians.

Price support fight. In a series of bitter disputes, from the 1950's through early 1970's, Congress dropped most price supports for perishable goods. After world market prices rose sharply, price floors were slightly below world market prices.

Along with benefits, the postwar production boom created new problems. It was difficult to balance supply and demand in the 1950's and 1960's. Programs to take land out of production failed to significantly reduce farm output.

Also, foreign markets began to dry up as Europe recovered from World War II. Surplus farm products piled up in warehouses.

Some American policymakers then suggested that food could be an effective tool in developing the poor countries of Asia, Latin America, and Africa. This would also reduce mounting storage costs, as well as extend humanitarian aid.

Managing surpluses. In 1954, Public Law 480, the food for peace law, was enacted by Congress, and was renewed in 2-year intervals through most of the 1960's. This program enabled the U.S. to keep surpluses at manageable levels.

The program fell under criticism because some suggested that it led to an unrealistic assumption in some developing nations that the U.S. could fill their food deficits indefinitely. This led to neglect of agricultural development in these nations. So, the law was amended in 1966 and 1968 to serve notice to such countries that the U.S. intended to gradually phase out such programs.

The controversy soon became moot, however. Unprecedented world demand and extremely adverse weather developed in 1972 and wiped out the surpluses and normal stocks in storage.

Feeding the needy. Public Law 480 also contained a provision for distributing surplus foods to needy Americans. During the 1950's, opponents restricted this use. But in 1961, President John Kennedy kept his promise by ordering the rapid expansion of domestic food distribution.

Government-owned food was donated to school lunch programs, other child feeding programs, and institutions. The Food Stamp Program was revived and expanded. By the summer of 1975, some 19.5 million Americans were receiving food stamps.

As concern for the Nation's poor rose, an irony became evident: rural Americans, who collectively produce food for much of the world, had a disproportionately high percentage of America's poor in the 1950's and 1960's.

Out of the dust, a great new day of American agriculture arose, led by technological advancements such as tractor improvements, chemicals, and soil conservation methods. Farming became an efficient, commercial enterprise.

In 1955, USDA proposed locally oriented programs to develop industry and tourism in the Nation's poorer rural communities. Although efforts have intensified, the problem lingers even today.

Mind-boggling. Despite occasional problems and harsh side effects, the thrust of American agriculture was, is, and probably will be mind-boggling.

Looking ahead, scientists and economists differ in their prognoses for American agriculture. A scientist wrote in 1970: "Continuing development and application of technology in production of food, fiber, and forest products can supply the next generation abundantly." But the backlog of new agricultural technology was described as "dangerously thin" in a 1975 National Academy of Science report, and funds for agricultural research have been cut.

Lingering problems. Still other problems exist. The fossil fuel shortage is a continuing concern to the agricultural industry, which is now highly mechanized. And the question of who will control farming in the future is also troublesome, as high capital investments in land and machines make entry into farming difficult for some individuals.

Some forecasters predict that farming will be controlled by a few corporations, with operations almost entirely mechanized by the year 2000. But others, such as Don Paarlberg, USDA's Director of Agricultural Economics, disagree. Paarlberg contends that the family farm "is likely to be around when those who despair of its survival have gone to their reward."

Farmers are a tenacious group. Despite continuing changes in technology and lifestyle, they cling to traditional rural values, and treasure the human virtues of farming: independence, individual decision-making, plentiful family living space, and the opportunity to contribute to the Nation's well-being.

[Based on the manuscript "American Agriculture: From Wilderness to Bread Basket," by Wayne D. Rasmussen and Jane M. Porter, National Economic Analysis Division.]

The Dustbowl...

As the 1930's rolled in, farmers could concentrate on the pursuit of a dream of prosperity without such painful distractions as Indian attacks. It was a time of peace when men devoted all their energy to taming the land.

And tame it they did. They worked the soil as hard as they worked themselves to win a better life for their families.

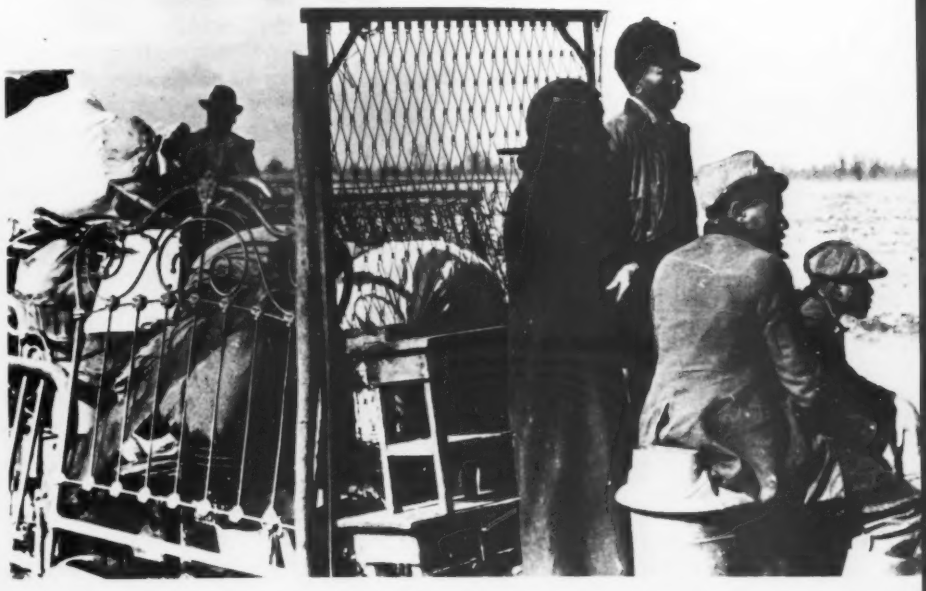
Then, whipped by great winds and freed by a terrible drought, the soil rose from the earth in vast clouds, leaving seed naked and as impotent as the

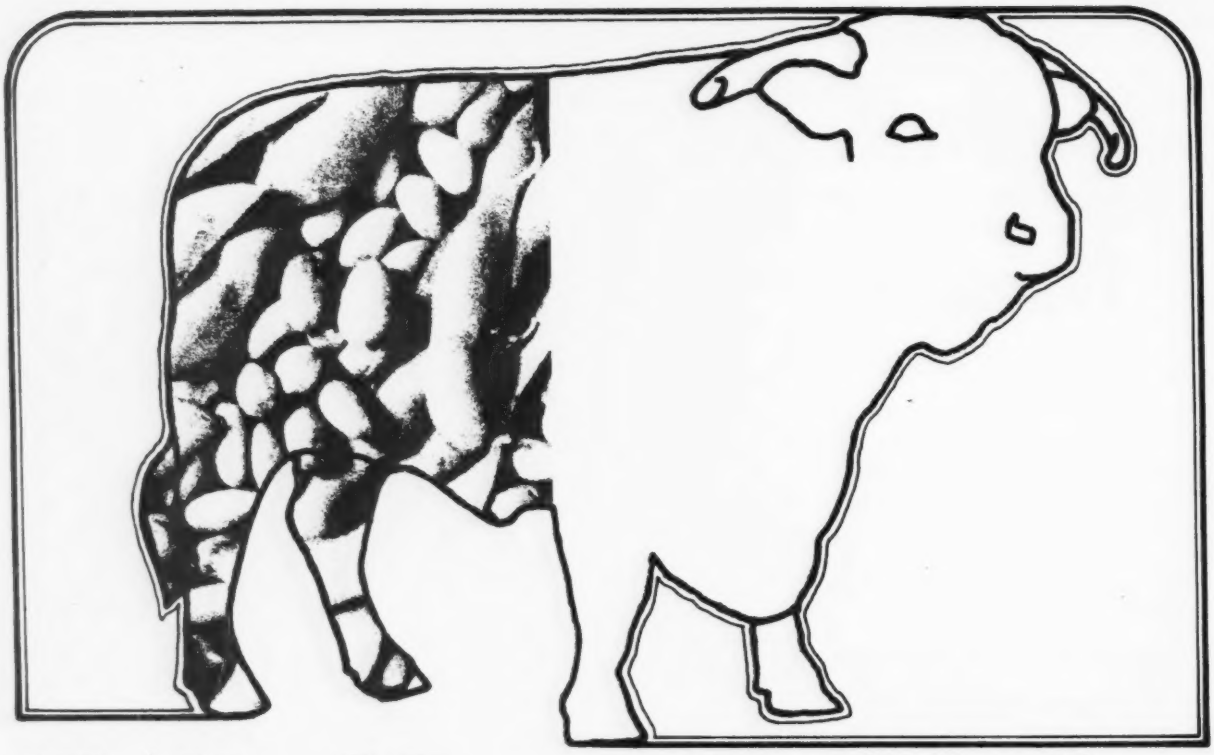
Stirred by winds up to 55 mph, dust gives a prairie town (above) an eerie atmosphere. Sand drifts besiege a Texas farm (below) in 1938. A Colorado farmstead (right) is abandoned to the great drifts.

...End of a Dream

dreams of the anguished farmer. As days passed by without rain and without hope, many farmers loaded their meager belongings onto wagons and trucks to drift across the Nation, bankrupt of all they had worked for.

The fury of the dust storm made roads into pits of silt that offered little traction for automobiles (upper right). The end of a dream is reflected in the sadness of an uprooted family (lower right).





The Ups & Downs of Beef Plus Soy

When beef prices shot up in 1973-74, a new product caught on at the meat counter as a cheaper alternative to increasingly expensive hamburger. This year it may catch on again.

Actually the newcomer had been around for some time in other forms, such as frozen patties and institutional food, but this was a first for wide-scale distribution of freshly-ground beef plus soy.

Consisting of three parts ground beef to one part hydrated textured soy flour or concentrate, the soy-beef blend got off to a rousing start. In a sample of three large grocery chains, it captured more than 30 percent of all ground beef sales at its peak in 1973, and its market share averaged 24 percent over a 46-week period. During this time, it sold for an average of 19 cents per pound less than regular hamburger.

Hard times. Then soy-beef ran into harder times. After price ceilings for red meat were lifted in mid-1973, beef supplies grew and prices turned down again in 1974.

The blend's market share also edged down from late 1973 through 1974, and by late last year had dipped to less than 10 percent of ground beef sales. The reason: consumers turned back to their favored hamburger in force last year as large supplies reached grocery stores at lower prices.

Hamburger's abundance was aided by 1974's skimpy, high-priced grain crop, which sent large numbers of cows and younger, leaner grass-fed animals to market. And more cows and grass-fed cattle generally mean more hamburger.

Now, however, economists figure there's a chance for some resurgence in soy-beef sales. At least, 1976 looks better for the blend than last year.

Cow prices up. For one thing, cattle prices are expected to firm up somewhat through summer. And after last year's large cow slaughter, cow prices have been gaining steadily so far this year. Meantime, fed cattle markets are up, boosting supplies of choice table cuts.

At this point, retail prices for ground beef have not fully reflected the strengthening cow prices—economists say prices are adjusting to the changing mix of cattle marketings—but when they do, soy-beef blends should benefit.

While the price incentive may be there, consumer acceptance is another matter. During 1973-74, the blend's sales showed that consumers would buy meat containing soy protein—if prices differed sufficiently between the all-meat and the blended product. Dissatisfaction with beef prices, rather than changing preference, was a major factor in consumers' acceptance of the soy-beef blend.

Responsive sales. Data from the 1,500 stores surveyed indicated soy-

beef sales were very responsive to changes in the blend price and in the price of regular ground beef.

For instance, in November 1975, when the blend's market share had dropped to 8-10 percent, ground beef was regularly selling for 59 cents a pound in some markets with the blend priced at 49-55 cents a pound. In other markets ground beef was selling at about 69 cents a pound with the blend about 10 cents a pound less.

These low beef prices and the narrow margin between the two products were behind soy-beef's shrinking sales. However, the grocery stores participating in the study still felt soy-beef was a viable item and that sales would rise when beef prices increased.

Cyclical market. Generally, the blend's sales trends suggested the mass consumer market was likely to be marginal compared to the more consistent institutional demand. Since soy extenders usually made up only a quarter of the ground mixture, retailers found it difficult to maintain a significant price margin between the blend and hamburger as beef prices decreased.

Information from the chain stores also gave researchers an idea of how income levels affected blend sales. In one study, five inner city stores were matched with stores of similar size in the suburbs. In another, sales from nine inner city stores were compared with all other sales for a marketing division.

Inner city sales up. In the five matched stores, market shares for the soy-beef blend were initially about the same. Then inner city consumers began to buy proportionately more of the blend than their suburban counterparts did. Economists said this finding was borne out by other research that indicated soy-beef's market share was usually significantly higher in lower-income areas than in medium and high-income areas.

However, when the nine inner city stores were compared with other division sales, results differed somewhat. Here the blend's sales lagged in the inner city for the first several weeks. Then the lower-income consumers upped their blend purchases to match those of other consumers, and the blend's market shares differed little between the two groups in succeeding weeks.

Educating consumers. As a result, researchers concluded that an educational program about the blend and its uses might be more fruitful in lower-income areas where acceptance was less rapid. Different forms or approaches in advertising might also be helpful in promoting soy-beef sales.

Although estimates of total soy-beef sales in the U.S. came to only 2 percent of all retail beef cuts in 1973, economists felt the figures represented a solid showing for a new product. Considering their small quantities, soy meat extenders hardly posed a threat to the meat industry, but they did provide a way to stretch available meat—and moderate price increases—when supplies were limited.

Soy-beef marketings also had an impact on the soy processing industry. Economists noted that the amount of soy flour going into edible soy products increased during the May 1973 to March 1974 study period, coinciding with the blend's arrival in stores.

More textured soy products. According to soy industry estimates, much of the flour was channeled into about 100 million pounds of textured soy products in 1973. This was up substantially from 1970's output of 25-30 million pounds, and was probably double 1972's textured soy production.

A minimum estimate of 15 million pounds dry weight (44 million pounds rehydrated weight) was sold in soy-beef blends during the 46-week study period. The blend apparently also triggered the introduction of packaged textured soy products at retail counters.

Production of edible soy flour declined from mid-1974 into 1975—again coinciding with trends in soy-beef sales—although probably not all of the decreased production was due to the downshift in blend sales.

[Based on "Estimated Sale and Impact of Soy-Beef Blends in Grocery Stores," article by William W. Gallimore, National Economic Analysis Division, in the *National Food Situation*, NFS-155, Feb. 1976.]

But Will It Sell?

Soy-beef may be cheaper than hamburger, and nutritious, too. But what happens if consumers feel it isn't "the real thing"?

When ground beef blended with textured vegetable protein (tvp) was first introduced in grocery stores, retailers devised a variety of names to differentiate it from regular hamburger. This may have aided product identification, but researchers wondered if consumers' knowledge of the product's ingredients may not have negatively influenced their impression of the blend.

To find out, two taste experiments were conducted to test consumer preference for the blend compared to regular ground beef. In the first experiment, participants did not know which of the sample meatballs contained tvp and which did not. In the second, the meatballs' contents were identified.

Results indicated that without prior knowledge of product content, participants showed little difference in preference among the meatballs. However, when they did know which sample was regular hamburger, they significantly preferred it over the others.

This taste test suggests some problems for processors and commercial users of tvp. If consumers don't regard the blend as a desirable substitute for an all-meat product, their acceptance of the blend and growth of tvp use may not be as rapid as expected unless other incentives are provided.

Since the blends generally do have a price advantage, it remains to be seen whether lower prices will be sufficiently compelling to change consumer perceptions about tvp in hamburger.

[Based on "Taste Preference for Hamburger Containing Textured Vegetable Protein," article by Jon Weimer, National Economic Analysis Division, in the *National Food Situation*, NFS-155, February 1976.]

The Island of Hawaii slowly builds up new soil reserves from lava flows.

Aloha Agriculture

In this issue, The Farm Index reports on agriculture in Hawaii, which, like Alaska featured in April, is often bypassed in our data series.

Hawaii . . . a land of warm sea breezes, palms, luaus, and leis; a land of tropical splendor and leisure living. And a land well suited for agriculture.

Long before Captain Cook discovered the islands in 1778, the natives had put the fertile soils and year-round growing season to good use. With their simple agricultural skills and tools, they had been supplying all their food and fiber needs for centuries.

Although Hawaii is no longer self-sufficient in food production, agriculture is still a big part of the State's economy. In 1975, sales of farm products totaled over $325 million.

Sugarcane—agricultural kingpin. Sugarcane is the kingpin of Hawaii's agriculture. In fact, due to premium prices for the 1974 sugar crop, total Hawaiian farm sales that year—at $636 million—were substantially higher than the 1975 figure.

Sugarcane is grown commercially on four of the populated Hawaiian islands, taking in about 225,000 acres, or 5 percent of the State's land area. Even with the fairly recent consolidation of sugar lands and the phasing out of marginal production areas—chiefly the northern shores of each island—about the same amount of land was in cane in 1974 as in 1960.

Cane growing is big business, as 16 plantations grow over 90 percent of the crop. The rest is grown by more than 500 independent operators, mainly on the island of Hawaii.

Nine-to-1 ratio. The cane crop is processed into raw sugar in Hawaii and then shipped to the mainland for refining. For about every 8 or 9 tons of harvested cane, 1 ton of raw sugar is produced.

Sugar has been a major export item since the first recorded shipment of 2 tons of cane from the islands in 1837. The islands now supply about 10 percent of the American sugar market, with Hawaiian sugar mainly going to the western and midwestern States.

The sugar industry has problems. The thorniest is labor.

Although Hawaii's cane workers are the highest paid in the world, their salaries rank below those of construction workers, service industry workers, and some tradesmen in the State. Only through new technology has the sugar industry been able to offer competitive wages.

Environmental issues. Environmental concerns haven't helped. Some cane processing plants have shut down or consolidated in a move to cut down on polluting effluents going into the ocean.

Cane burning has also been under fire as a source of air pollution. Although a small amount of the "bagasse"—dry remains of sugarcane after the juice has been extracted—has been fed to livestock, the majority has traditionally been burned in the fields. A power generating plant on the island of Hawaii, however, will soon produce electricity by using some of the cane waste as fuel.

"Free market" uncertainty. Another cloud over the sugar scene comes from the expiration of the 40-year-old Federal Sugar Act at the end of 1974. Under this protective legislation, the U.S. Government determined how much sugar could be sold in the U.S. at a fair price to both producer and consumer and set sales quotas for domestic and foreign producers.

Opinions now differ over what impact—if any—the "free market" situation will have on Hawaiian

sugar. At least for this year, output is expected to remain about the same as last year, barring bad weather. (And weather may take a bite if the effects of recent droughts catch up with the cane.) Also, prices will probably subside from the record highs of 1974, but will hold above pre-1974 levels.

Pineapple falling back. Hawaii's No. 2 agricultural industry—pineapple—has been gearing down production since 1972. Output in 1974—at 704,000 tons—was off a fourth from 2 years earlier. And the number of pineapple plantations dropped by almost one-half, although the bulk of production remained in the hands of four large producers.

Factors leading up to this cutback in production are: continuing labor problems, shipping strikes at harvest time, high taxes and land valuation, and intense foreign competition.

As a result of all the high input costs, Hawaiian pineapple—particularly processed—is especially vulnerable to foreign competition. On the grocery store shelf, canned Hawaiian pineapple is now more expensive than foreign, both in the U.S. and in other countries.

Second thoughts. However, some pineapple growers and processors who have been planning to abandon a lot of their Hawaiian production and turn their efforts to certain foreign countries are showing signs of hesitation. Reason: The grass may not be so green on the other side of the fence after all, due to increasing political uncertainties and rising production costs in those countries.

The fresh market has been a bright spot in an otherwise dimming picture for Hawaiian pineapple. More and more fruit is being grown for this market, some of it absorbing acreage taken out of production for processed pineapple. (A different shaped, sweeter pineapple is grown for the fresh market than the type destined for mechanical processing.)

Diversified agriculture. Aside from the "Big 2"—sugar and pineapple—Hawaii commercially produces a variety of other agricultural products. In 1974, sales of these products amounted to over $90 million, up almost 8 percent from the year before.

Fish ponds jutting into the sea are used to attract and raise mullet.

About two-thirds of the dollar value came from livestock.

The State produces all the fresh milk and most of the fresh eggs it uses, but only half the beef, one-third of the pork, and one-fifth of the chicken. A damper on livestock raising has been the fact that practically all feed must be shipped into the islands, thus boosting production costs. Efforts are being made, however, to grow more feed and forage in the State.

Currently, about a fourth of Hawaii's total land area is devoted to livestock grazing. And most of the ranges are on the island of Hawaii.

Hawaiian pork waning. In 1974, Hawaii marketed over 28 million pounds of beef, but only 8 million pounds of pork. Particularly with the booming tourist trade, demand for

Polynesian traditions such as the hula and lei generate a big flower market.

(Hawaii Visitors Bureau Photo)

(Hawaii Visitors Bureau Photo)
Waikiki Beach, with its many tourist attractions, symbolizes the potential tug between Hawaii's agriculture and tourism.

beef is high, but demand for Hawaiian-style pork is low.

Hawaiian pork, produced at a premium price compared with the mainland U.S. product, is marketed as a specialty item—"fresh, hot pork." Most of the meat is boned and sold fresh from slaughter—an Hawaiian tradition. However, tradition seems to be losing out as more consumers—along with the hotels and restaurants—opt for cheaper, more readily available, chilled or frozen pork from the mainland.

Dairy farms, mostly confinement operations in the State, produced over 137 million pounds of milk in 1974. Since Hawaii does meet its own milk needs, the amount produced is regulated by a State commission to prevent oversupply.

Dairying expensive. Prices, too, are regulated by the commission. Consumers now pay over $1 for a half gallon of milk. Although considerably higher than mainland prices, this price reflects the high cost of capital investment necessary for Hawaiian dairying, and is in line with the higher cost of living in the State.

Egg production totaled 207 million in 1974. Since the 1950's the State has gone from an importer of nearly half its eggs to a supplier of about 95 percent. On the other hand, Hawaii has remained an importer of chicken meat, with slightly less than 6 million pounds of dressed-out chickens produced there in 1974.

Farming the sea. Marine farming has a long and illustrious history in Hawaii. At least 800 years ago, ponds were built out into the ocean to attract, raise, and harvest mullet and milkfish. When dried and salted, the fish were a major bartering item.

This type of fish farming still exists to some extent in the islands, but research is underway to develop a more sophisticated aquaculture. Rather than simply catching baby fish from the sea and rearing them to the marketing stage in captivity, some farmers are trying to both propagate and raise the fish in ponds. Several types of marine animals appear likely candidates—such as shrimp, oysters, clams, and even fresh water trout.

The crop scene. On the crop scene (excluding pineapple and sugarcane), vegetables and melons get the biggest chunk of the market dollar. In 1974, these products pulled in $10 million.

Pineapple harvesting is still a very labor-intensive operation.

Poi, a long-time Islander food staple, is made from the taro plant.

Still, though, the State has to ship in more vegetables than it grows. Crops for which imports outweigh home production are: broccoli, carrots, celery, lettuce, dry onions, bell peppers, potatoes, and tomatoes. Crops which are basically totally imported are: artichokes, asparagus, brussels sprouts, herbs and spices, leeks, mushrooms, Chinese peas, spinach, turnips/rutabagas, and yam bean root.

In addition to those vegetables commonly grown on the U.S. mainland, Hawaiians produce some specialty crops including daikons (Japanese radishes), Kula onions, lotus root, Chinese cabbage, and ginger root. Some of these have promising export potential.

Hawaiian poi. Outside the general class of vegetables, Hawaiians cultivate a plant called taro. From its tubers, they make poi—a concoction of taro root mixed with water, cooked, pounded into paste, and fermented before eating.

For centuries, poi was the staple of the Hawaiian diet. Today, it's much less important, but in 1974 taro root grossed $900,000 of sales. That's in addition to local patches of taro which never reach the marketplace. Some poi is shipped to the mainland, but this market has been declining.

Coffee decline. Hawaii also produces some coffee, and this industry, too, has been on the decline. At a peak of 18.5 million pounds in 1957, output has dwindled to only a fraction over 1 million pounds in 1974.

Coffee production is concentrated in the Kona District of the island of Hawaii—a rough, hilly area, resistant to mechanization. As a result, hand labor must generally be used, boosting Hawaii's coffee prices above those on the world market. And because of low profit margins, many farmers have quit or have relegated coffee farming to part-time as they take on other jobs.

Fruit production, excluding pineapples, is generally holding its own, and in the case of the papaya, zooming ahead. In 1974, fruit sales totaled over $6½ million.

The papayan star. That bright star on the fruit horizon—the papaya—has proved to be not only a popular food for island consumption, but also enjoys a good export business. In the past decade, production has doubled, topping 37 million pounds in 1974, and from preliminary estimates, significantly higher in 1975. The dollar value of sales in 1974 was $4.8 million.

Billed as everything from "the gift of the tropics" to "the exotic melon that grows on a tree," fresh papayas have been making their way into more and more shopping carts in the U.S. mainland and Japan. In fact, since 1971, papaya shipments to the mainland and Japan have exceeded island consumption.

In addition to the papaya, six major fruits are grown in the State: bananas, passion fruit, oranges, tangerines, avocados, and guavas. Also, a small amount of mangos and lichees is produced.

Up-and-coming nut. The macadamia nut is another up-and-comer of Hawaiian agriculture. Tree plantings have increased in recent years, and the export market is bright.

In the past decade alone, production has nearly doubled, hitting 13.8 million pounds in 1974, or $4 million dollars worth. As more mainland and foreign consumers become acquainted with Hawaii's unique nut, demand will probably up production even further. Of course, foreign com-

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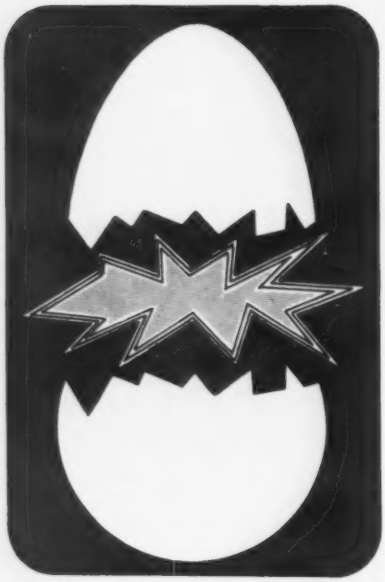


Conserving Energy in the Poultry Industry

It takes a lot of energy to run the poultry industry. Brooding, lighting, ventilating, cooling, assembling, processing—all these operations require huge amounts of energy.

For example, in 1974 the marketing of poultry and eggs gobbled up about 6 million kilowatt-hours of electricity, and 400 million gallons of both heating and motor fuels. The cost: roughly $421 million, or 9 percent of the total cost of moving poultry products from farm to consumer.

Production activities used less energy—195 million gallons of propane, 49 million therms of natural gas, 9 million gallons of fuel oil, 33,000 tons of coal, 31 million gallons of gasoline and diesel fuel, and 1.4 billion kilowatt-hours of electricity. These cost about $126 million, or 2 percent of the gross farm income from poultry and eggs.

Total costs. Total energy outlays in 1974 approached $550 million, and in 1975, were at least 15 percent higher. In 1976, dollar costs may rise again with additional hikes in energy prices.

Energy expenditures for production in 1974 were about 1.9 cents for every live broiler marketed, 15 cents per live turkey, 11 cents for each laying hen in the Nation's flock (or about 0.6 cents per dozen eggs sold), and 4 cents per head of nonbroiler chickens and miscellaneous poultry, such as ducks and game birds. Costs per unit are about 50 percent higher than in the mid-1960's for chickens and miscellaneous poultry and 300 percent higher for turkeys and egg production.

Industry's vulnerability. Recent increases in energy costs and diminishing supplies have made the poultry industry—a large user of gas and petroleum—vulnerable to short and long-run shortages. Nearly all regions of the country are heavy users of propane for brooding, and some are particularly dependent on natural gas and fuel oils.

Although the poultry industry requires more total energy than a decade ago, it uses slightly less per unit of output. This is due to more efficient use of heating fuels (especially for broilers), large-scale production and marketing, an expansion of supply areas, more direct marketing channels, some changes in product forms, and improved technology.

Ways to save energy. Despite the industry's recent efforts to conserve energy, there's room for even greater savings. In the short term, more attention should be given to improving energy management. In individual cases, for example, energy use in production could be shaved 20-50 percent through such measures as partial house brooding, winterizing side curtains, more efficient lighting schedules, reducing light intensity, following proper ventilation practices, intermittent feeding, adding insulation, and improving building and equipment maintenance.

Energy savings in industry could be as much as 10-15 percent for modest efforts to 35-40 percent with major revisions in manufacturing facilities.

Long-range efforts. Long-range conservation efforts by the poultry industry could center on making better use of alternative forms of energy, such as solar, methane generation, and wind power.

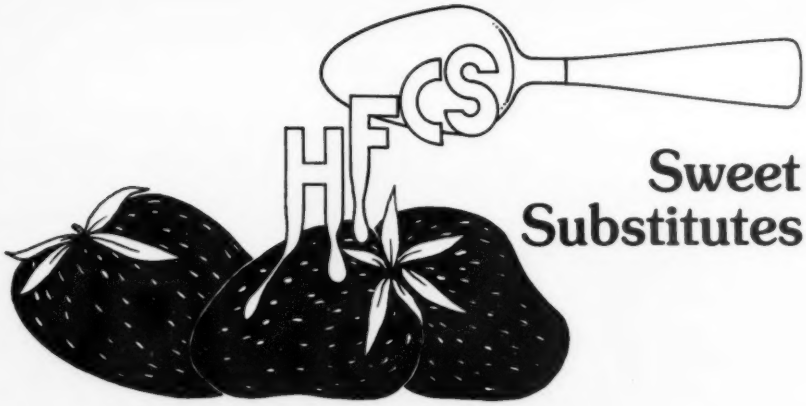
Solar energy—abundant, renewable, and nonpolluting—could be used to heat and cool broiler houses and to dry grain. Right now it's too expensive to be widely used, but solar has the potential of becoming an economically competitive energy source.

Obtaining methane—a gas formed from waste material by an anaerobic digestion process—from poultry manure would not only reduce the problem of waste disposal, but the methane gas could be used as a substitute for other sources of energy. The use of wind to power small electric generators could provide electricity for lighting, the operation of mechanized equipment, and various other uses. Like solar energy, these two sources cost a lot right now, but might become practical in the future.

Modifying transportation costs. Other long-range objectives for energy conservation include the modification of existing transportation regulations—current rules limit the routes along which cargo can be hauled and eliminate return hauls in many instances—and greater use of combined-mode transportation arrangements involving rail and piggyback trailers, truck and barge. Energy-related conflicts between various Government regulatory programs also need to be resolved.

Additional conservation measures that deserve attention are the reuse of hot water for processing operations, standardization of State water quality regulations, new drying methods to control waste disposal pollution, reuse of heat dissipated from ventilation, new types of building materials, simplification and standardization of packaging and containers, irradiation preservation, and vacuumized containers. Poultry and egg firms may also become more involved with on-site private power generation groups and with the development of energy parks.

[Based on the manuscript "Energy Use and Conservation in the Poultry Industries" by George B. Rogers, Verel W. Benson, and Donald L. Van Dyne, Commodity Economics Division.]



Sweet Substitutes

If the thought that you may have ingested some HFCS disturbs you, relax. It's not a toxic substance or even a chemical additive. Rather, it's a natural sweetener—High Fructose Corn Sirup.

HFCS, a relative newcomer on the sweetener scene, may turn up in your soft drinks, canned or frozen fruit, preserves, or even in your bakery goodies—in any food where moisture is desirable. You won't find it in such things as most confectionery, presweetened dry cereals, and packaged prepared cake mixes. Reason: HFCS, like other corn sirups, is hygroscopic—that means it draws moisture from the air, thus you could end up with a bowl of soggy cornflakes.

So why a high-fructose corn sirup rather than just a plain, ordinary one? Sweetness is the answer. Regular corn sirups are less than two-thirds as sweet as HFCS, which is about as sweet as sugar.

Some limitations. Though HFCS can be substituted for sugar on a one-for-one basis in some things, it still has its limitations. For example, in soft drinks, only 50-75 percent substitution ratio is currently recommended so that the color or taste of the end product doesn't change.

Another big factor holding back HFCS is its availability. Only three firms now make HFCS in substantial quantities. And although more producers will be entering the market in the next couple of years, the supply may still lag demand for awhile.

Use of HFCS is, nevertheless, on the rise, and has been partly responsible for the boost in per capita consumption of all corn sirup. For 1975, it is estimated that the average consumer downed about 18 pounds (dry basis) of regular corn sirup, up 5 pounds from 1970.

Consumption of another corn sweetener—dextrose—has not changed much. Per capita intake in 1975 of around 4.5 pounds was about the same as in 1970.

Fermentable dextrose. The market potential for dextrose is more limited than for corn sirups, though, since dextrose is mainly used as a fermentable agent rather than as a sweetener. Also, dextrose carries a higher price tag, so it is usually used where corn sirup is not easily substituted—in certain yeast-leavened bakery products where a brown crust is desired, and in tart-flavored crystalline-type candies.

Although we've been eating and drinking more corn sweeteners, it's not a sign that our "sweet teeth" have been growing. Just the opposite. We've actually cut down on sugar—to the point that on the average we consumed about 11 pounds less of all natural sweeteners in 1975 than in 1973.

Of course, high sugar prices were mainly responsible. They also made corn sweeteners more competitive, particularly in light of favorable corn prices.

Saccharin up slightly. Besides corn sweeteners and sugar, last year some of us also consumed some saccharin—the only noncaloric sweetener commercially produced in the U.S. since cyclamate was banned in 1970. Consumption per person is estimated at 7 pounds (sugar sweetness equivalent)—a slight rise over 2 years earlier.

Although high sugar prices edged up saccharin consumption a bit, most saccharin use is basically unaffected by swings in prices of caloric sweeteners. That is, most people who use saccharin desire sweetness with the fewest calories, price notwithstanding.

Limited substitute. Saccharin itself is limited in its ability to substitute for sugar. One problem is its aftertaste. Another is that it doesn't provide necessary body or bulk in confectionery, and in many baked goods, it doesn't act as a fermentable base for yeast, as does sugar.

So what is in store for the nonsugar sweeteners? Although dextrose and saccharin consumption will probably change little in the near future, how much corn sirup we eat—both regular and high fructose—will depend significantly on sugar price levels.

And future sugar prices are a big question mark. Since the expiration of the U.S. Sugar Act in 1974, we have entered the world "free market." Just what domestic prices will do in this situation is uncertain, but they are expected to remain below 1974 highs for awhile.

The demand factor. Consumer resistance in 1974 also showed that the demand for sugar is not perfectly inelastic. That is, when prices get out of sight, consumers cut back on their buying—a reaction which helps curb price increases.

Even with possible lower sugar prices, the corn sweetener industry has HFCS's future pegged as rosy. It is predicting that by 1980 U.S. consumption will be up 5½ times to 3 million tons (dry basis).

However, since regular corn sirup costs less than both sugar and HFCS, it doesn't appear likely that it will lose its toehold to HFCS. In fact, consumption of regular corn sirup may increase some by 1980, although probably not as much as in recent years.

[Based on "Sugar Substitutes: Their Competitive Position," speech by Fred Gray, Commodity Economics Division, at the World Bank Seminar, Washington, D.C., February 20.]

Farming Minus the Plow

Those sturdy plows that farmers have been using for centuries could become almost obsolete by the year 2000. Hard to believe? Not when you consider the growing acceptance in this country of a concept known as minimum tillage.

It is just what the name implies—the soil is tilled at its minimum acceptable level—and in some cases, it may not be tilled at all. Then it's usually referred to as "zero till" or "no till." The level of tillage is determined by the type of crop, soil content, and climate conditions.

The main reason many farmers want to retire their plows is the projected savings in production costs through reduced tillage—up to $1.6 billion annually for labor alone. Machinery and equipment costs would also decline. Savings in energy, however, would be offset by greater outlays for pesticides.

Effective pesticides. The major requirement for successful minimum tillage is effective weed, insect, and disease control. Most reduced tillage systems involve at least one application of two or more chemicals. A second application might be necessary if a special weed or pest problem develops or persists. The use of a contact type herbicide before and/or at the time of planting is recommended for most no-tilled crops.

In 1974 about 33 million acres were minimum tilled, compared with only 3.8 million acres in 1963. A recent assessment by USDA estimates that by 2000 about 275 million acres, over 80 percent of the total land in production, could be minimum tilled. Of this, 153 million acres, or 45 percent, could be zero tilled.

Substantial savings in labor. Prospects of significant savings in production costs are enticing to farmers. Savings in labor alone could approach $1.6 billion annually by 2000 if all labor saved, hired and family, were valued at $3 per hour. (Estimates are based on USDA's projected figures of 81 and 45 percent for the planted crop acreage that could be minimum and zero tilled, respectively, by the year 2000.)

Such reduced labor costs would be possible because as many as 350,000 fewer man-years would be needed to perform preharvest farm operations by 2000, thanks to reductions in tillage. That's a 12-percent savings in total farm labor requirements. Since

most preharvest chores are performed by family members, rather than hired workers, savings in labor could spell increased off-farm employment or more leisure time for members of farm families.

Seasonal savings. For some farms, labor savings might encourage expansion in crop acreages and farm operations. Since savings in labor occur only in preharvest operations, they are highly seasonal. Also, they vary greatly among farming regions and farms. Labor savings will mean the most to regions or farms with a high concentration of grain, soybeans, or corn—crops which take best to reductions in tillage.

However, since total farm employment (family and hired labor) is expected to be only about 2 percent of the Nation's workforce in the year 2000, any national employment impact of reduced tillage will be negligible.

Reduced spending for machinery and equipment. Other production costs that would be affected by further substantial reductions in tillage are machinery, energy, and pesticides. Investments in farm machinery and equipment, as well as their costs, are expected to decline as a result of minimum tillage. However, additional experience, data, technology forecasting, and economic analyses are needed to arrive at specific conclusions about these costs.

At current energy prices, production costs for operating farm machinery would be slashed by $275 million annually by 2000 through reductions in tillage, at a savings of 850 million gallons of petroleum each year, or about 3 gallons per acre.

Greater pesticide use. Unfortunately, reductions in energy costs are offset by an estimated annual increase of $300 million for pesticides by 2000. A minimum overall increase in pesticide usage of 2 pounds per acre (1 pound insecticide and 1 pound herbicide) is assumed. This is equivalent to about 0.6 gallons of petroleum per acre, or slightly more than 90 million gallons a year.

Minimum tillage could increase total U.S. crop output by about 5 percent each year by 2000, due to a projected annual expansion in harvested cropland of 20 million acres. Most of the expansion—15 million acres—would come from multicropping. This is about triple the 1969 average. The remainder would come from new land being brought into production as a result of reductions in tillage.

Multicropping and minimum tillage. Multicropping or "double cropping" has a long history in American farm production. In association with reduced tillage, multicropping means growing three or four crops on the same land in a 2-year rotation cycle, or four or five crops in 3 years. Soybeans are a typical second crop grown in many locations.

Multicropping is common in areas of the South with long growing seasons. But the potential has also shifted northward with the development of earlier maturing varieties of crops and with mechanization that reduces the time required to get the land ready for the second crop.

Northward expansion. Reduced tillage, especially no till, may be playing a role in this northward expansion of multicropping. Because reduced tillage accounts for a slight savings in soil moisture—as much as 2 inches a year—and from a week to 10 days in planting time, a second or third crop can be grown in many northern areas which previously had grown only one.

Nationwide, average crop yields would not change measurably in the next 25 years as a result of minimum tillage. Stable yields, or even slightly lower yields, would probably be

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Not a New Idea

Minimum tillage has been gaining ground in the past few years—more than doubling during the 5-year period 1969-1974. The 33 million acres of farmland involved in 1974 was quite a jump from the 3.8 million in 1963.

The idea of minimum tillage is not new. Wind erosion in the Great Plains led to investigations of stubble mulching as far back as the late 1930's. Wheat producers shortly after World War II began making shallow cuts in the soil with a sweep, chisel, or disc, leaving the residue of the preceding wheat crops intact on the surface. Now it's common on nearly all the land left in fallow following the wheat harvest in the Great Plains. Other regions also use this form of minimum tillage for other small grains.

One of the first agriculturalists to become publicly disenchanted with the plow was Edward Faulkner, the apparent father of "no till" farming. In his 1943 book, *Plowman's Folly*, Faulkner said that moldboard plows "are contributing to the destruction of America through erosion, sour soil, floods, dropping water tables, vanishing wildlife, and soil compaction."

Minimum tillage wasn't taken seriously until after World War II, when herbicides such as 2, 4-D were developed that could be substituted for tillage operations for weed control. At first, the substitutes were for post-planting cultivations of row crops. Later, herbicide use contributed to the reduction in preplanting weed control—namely, moldboard plowing and seedbed preparation.

Soon after the war, the planting of potatoes on rough-plowed land, or on an unprepared seedbed, became practical. This tillage method was the forerunner of "plow-plant" or "wheel-track"—the first widespread reduced tillage systems for corn production in the Midwest.

In the 1960's much of the tillage research centered on "no till"—a form of minimum tillage in which the crop is planted directly in the soil without prior plowing or seedbed preparation. This tillage system became practical for adoption after 1960, especially on the well-drained soils of the southern Corn Belt region.

acceptable to farmers because of savings in production costs and other values.

Soil losses cut in half. For example, soil losses through erosion could be cut back 50 percent or more by 2000 through minimum tillage. Since soil erosion may be the principal means by which agricultural chemicals move into downstream water systems, minimum tillage could help farmers comply with the 1972 amendments to the Federal Water Pollution Control Act, which requires the reduction of erosion and runoff from agricultural land.

Minimum tillage could also help farmers meet the requirements of the 1970 amendments to the Clean Air Act, which sets air quality standards. In areas subject to agricultural wind erosion, State plans to reduce this problem could encourage the adoption of minimum tillage.

Negative side. On the other hand, environmental protection laws and regulations relating to pesticide use could discourage further reductions in tillage. An increase of about 300 million pounds of pesticides would be required for the projected expansion of minimum tillage in the next few decades. This is at least 50 percent more than the usage which might be expected were present tillage practices to continue.

Social concerns about environmental pollution will continue unless future technical developments further reduce the potential adverse effects of pesticide use, or unless the expected decrease in soil erosion results in a reduced transfer of chemicals off the farm.

Future of minimum tillage. Acceptance of minimum tillage among U.S. farmers should persist, especially if domestic and world market conditions continue to support expansion in farm production. Farmers will be more likely to take advantage of multicropping, a practice enhanced by minimum tillage systems.

[Based on *Minimum Tillage: A Preliminary Technology Assessment*, Office of Planning and Evaluation, USDA, under the leadership of William B. Back, National Economic Analysis Division, Senate Committee on Agricultural and Forestry Print 57-398, September, 1975.]

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petition could enter the future picture, as other areas start to produce the nuts.

A plus to the industry is that the nuts can be grown on the poorer lands that are unsuited for most crops and many nonagricultural uses. A problem, however, is how to best harvest the nuts, which ripen over an extended period of time. Mechanization under such circumstances is difficult, but the hand labor now used is expensive and often hard to find.

Hawaii wouldn't be Hawaii without its flowers, and flowers and other horticultural crops are indeed big business on the islands—to the tune of $7 million in 1974.

Aloha symbol. The symbol of the Aloha Spirit—the lei—generates a good bit of the flower production, although some of the lei blossoms come from noncommercial sources. Commercially speaking, the two most important flowers for this use are carnations and the Vanda Miss Joaquim orchids. The plumeria, another lei favorite, is often plucked from the landscape, but is commercially grown on a limited scale.

Dollarwise, anthuriums are the State's top-ranking floral crop. In 1973, sales of anthurium cut flowers amounted to over $2 million. And the U.S. mainland is a big customer—and getting bigger. In 1974, Hawaii shipped 6.7 million of the blooms to the mainland, 3½ times the number sent in 1965.

The flower next in line is the orchid. Sales of this flower brought in $645,000 in 1973. Blooms are not only used in the islands for leis, corsages, and business promotions, but are also shipped to the mainland and foreign countries.

Future demand bright. In general, Hawaiian agriculture, in all its varied forms, has a bright future—demand wise. Two big factors are working in its favor: (1) increasing population and tourist trade on the islands and (2) greater demand for tropical products in the mainland U.S. and Japan.

Paradoxically, the first of these also poses a threat to Hawaiian agriculture. More people mean that more land and fresh water are needed for homes, hotels, shopping areas, etc.

Counting all 125 islands (only 8 of which are considered major ones), Hawaii has just a little over 4 million acres. And 16,000 of those are under water—in lakes and streams. About half the remaining land area is in farms or ranches, including not quite 400,000 acres of cropland. Not surprisingly some of the best agricultural lands are on the fringes of (or have already been engulfed in) expanding urban areas.

Fresh water watch. It may sound strange that water—even fresh water—would cause the slightest bit of concern in a tropical island State. However, the fact is, rainfall varies tremendously within the islands. Due to the mountainous terrain and the prevailing northeasterly trade winds, some parts receive over 500 inches a year, while others get only 15. As a result, a single island can range from lush tropics to arid, desert-like areas.

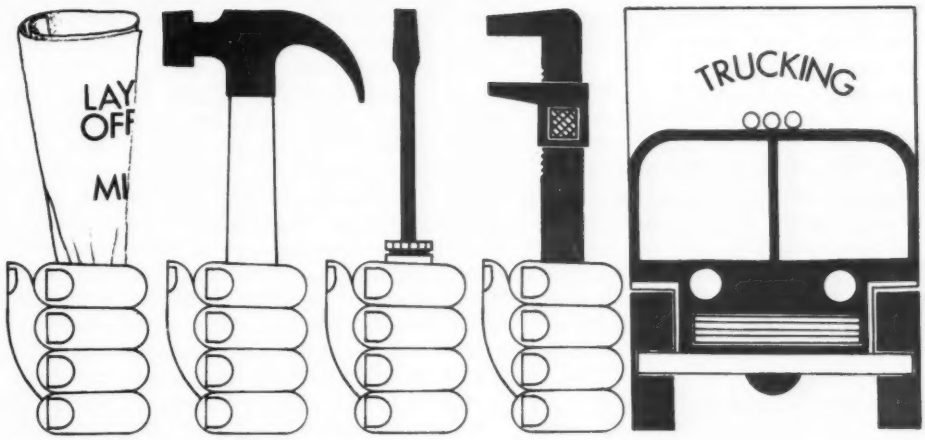
In the past, agriculture has been the No. 1 user of water in the State, with sugar and pineapple plantations taking the biggest share for irrigation. However, residential, industrial, and recreational users are making increasing demands on water supply.

Inflation's tide. Another problem Hawaiian agriculture faces—as does all U.S. agriculture—is the rising tide of inflation. In Hawaii, though, the situation is magnified. The high demand for competing land uses bids up land values, with potentially costly impacts. Farm labor costs spiral in accord with competing wages of service and construction workers. And transportation costs for major farm inputs are multiplied due to the long shipping or air distance from the mainland.

Adequate farm income, then, becomes a crucial determining factor in Hawaii's future farming. Those products that are in greatest demand—either because they are cheaper to produce in the State than to ship in, or because foreign or mainland markets are lucrative—will be the ones with the brightest future.

[Based on special material from Carson D. Evans, National Economic Analysis Division, and Howard Hogg and Karl Gertel, National Resource Economics Division.]

Pink Slips in a Small Town



Bisbee is a small town of about 8,600 residents located in the Mule Mountains of southeastern Arizona. It began as a mining camp in 1878, and copper mining remained its major industry until late 1974. During this time it had evolved—like many small rural communities—into a single-company town with some 1,200 people on the payroll of the major employer, the Phelps-Dodge Corporation.

Then Bisbee ran into trouble. Its economy—based as it was on a single natural resource—began showing signs of stagnation. But while rumors of a mine shutdown ran rampant for years, discouraging further capital development in the town, the threatened shutdown did not occur.

Finally, in late 1974, the combined forces of low copper prices and low grade of the remaining ore began a long-expected, but largely unplanned for, series of major reductions in work force.

Massive layoffs. In the 2 months after the open-pit shutdown, 370 workers were laid off (although about 70 were transferred elsewhere). Then in June 1975, 500 more were laid off when underground operations were terminated. By November 1975, only 200 workers were on the Phelps-Dodge payroll in Bisbee, down from 1,200 in previous years.

How different workers would adapt to their abruptly altered circumstances became the focus of researchers during the shutdown period. Specifically, they wanted to know if particular attributes and socioeconomic characteristics of the workers had any bearing on the order in which they lost their jobs, and on the manner and success with which they found other work.

The first to go. Out of the first block of unemployment claims filed, a picture emerged of the newly laid-off workers. Generally, they were stable household heads averaging 42 years old with a 10th grade education. Forty percent were Mexican-American, 82 percent were married with an average of three dependents, and 45 percent owned their own homes. Most viewed the quality of life in Bisbee as very high.

After breaking their sample down into 14 occupational types based on ethnic group, age, aspirations, and special skills, researchers examined unemployment files 22 weeks after the layoffs began.

Of the 289 workers studied, almost half were still out of work. About one-fourth had been rehired at the Phelps-Dodge mine at Morenci, in a neighboring county, and another fourth had either left town or found nonmining jobs in the area.

Limited skills. The largest category—whites with limited skills—were generally former miners or truckers who weren't old enough or who didn't have enough time with the company to receive partial retirement. Fifty-five percent remained unemployed. Of the 45 percent who'd found jobs, 40 percent were rehired by the Morenci mine.

However, results for Mexican-Americans with limited skills were somewhat unexpected. In the second largest category, only 40 percent were still unemployed after 22 weeks, and a greater share had been rehired by the company.

Whites with construction skills were a smaller group, but much more employable. Of the 75 percent who'd apparently found work, more than half were called up at Morenci.

Faring even worse. But their Mexican-American construction counterparts fared much worse. More than half remained on active unemployment rolls, although about the same number had been rehired.

Most of the "retired" whites—the third largest group—remained unemployed in Bisbee. They were older than the other workers and generally had been employed longer at the mine, but were below average in driver, mechanic, or construction skills. They took partial retirement involuntarily—most would have preferred to work if jobs had been available for their age group. None were rehired by the mine.

Although far fewer in numbers, "retired" Mexican-Americans seemed to make out slightly better. Eighteen percent were off the unemployment rolls, compared to 11 percent of the retired whites.

Mobile drivers. Young white truck drivers apparently either quickly got new jobs or moved out of town. Only 14 percent remained on the unemployment rolls, and only one was rehired

by the mine. Young Mexican-American truck drivers seemed just as employable, but 4 out of 7 were rehired by the company.

All of the multi-skilled whites rapidly found new jobs. Like the young white drivers, they generally were not rehired in Morenci. Results for both of these worker types implied high residence mobility.

In contrast, older white truck drivers found themselves mostly out of work in Bisbee, with some taking early retirement from the mine. None were rehired.

No significant difference appeared between Mexican-American and white mechanics. More than half were still unemployed, and most of those working had been rehired.

The last two worker groups were distinguished not by occupational skills, but by whether the jobhunters had a working wife. Neither the Mexican-Americans nor the whites in this group scored high on special skills, but the Mexican-Americans tended to be younger and had a higher share of inactive files. Equal numbers were rehired.

Some implications. Although the study was based only on the first 22 weeks of unemployment, preliminary findings suggested that young truck drivers were a great deal more mobile than other types of workers and found it relatively easy to get other jobs. Also, white construction workers seemed to have an advantage over their Mexican-American counterparts, and Mexican-Americans with limited skills—especially younger men with working wives—appeared to be favored in jobs with the mine.

In fact, the mine's hiring practices seemed to be shifting from favoring whites to Mexican-Americans. When older men were included in the ethnic groupings, equal numbers were rehired even though considerably more whites had been laid off.

Different directions. When the older workers were excluded, the percentages rehired by the mine differed greatly. Only 39 percent of the whites had been rehired, compared to 60 percent of the Mexican-Americans. While equal proportions of the two ethnic groups seemed to be finding new jobs, employable whites tended to leave the area, obtaining jobs in the nonmine economy.

Despite the employment problems following the mass layoffs, Bisbee's economy did not show signs of immediate collapse. Researchers surmised that much of the activity maintained in the area stemmed from the unemployment benefits drawn by the former miners. The real crunch may not come until later this year when the benefits begin to run out. At that time, when further studies are made, analysts feel they'll have a better idea of who can withstand the problems of a declining community.

[Based on "Reduction in Force in a Single Company Town: Who is Selected and How Do They Adapt?"—paper presented before the American Anthropological Association, Dec. 2-6, 1975 in San Francisco. By William Martin, Dana Deeds, Edwin Carpenter, and Harry Ayer, University of Arizona, and Louise Arthur and Russell Gum, Natural Resource Economics Division, University of Arizona.]

Recent Publications

Single copies of the publications listed here are available free from The Farm Index, Economic Research Service, Rm. 1664–So., U.S. Department of Agriculture, Washington, D.C. 20250. However, publications indicated by (*) may be obtained only by writing to the experiment station or university. For addresses, see July and December issues of The Farm Index.

Farmers' Use of Forward Contracts and Futures Markets. Allen B. Paul, Richard G. Heifner, and John W. Helmuth, National Economic Analysis Division. AER-320.

Forward contracting offers both potential advantages and problems for the farmer, this study points out. It evaluates both cash forward contracts and futures contracts in the farm business and gives tips on what to consider when thinking about contracting.

A Systems Analysis of the Hog-Pork Subsector. James D. Sullivan, formerly with the Commodity Economics Division, Charles Y. Liu, Foreign Demand and Competition Division, and Warren Vincent, Michigan State Universty. Tech. Bul. 1535.

Through a simulation model of the hog-pork subsector, the study analyzes the potential impacts of a number of possible changes in the form of vertical integration. The causal economic relationships are estimated from monthly data for January 1965-December 1971.

The Distribution of Shortrun Commodity Price Movements. Jitendar S. Mann and Richard G. Heifner, National Economic Analysis Division. Tech. Bul. 1536.

In an effort to enhance understanding of pricing on the commodity markets, this study analyzes daily closing futures prices during 1959-71. Prices for nine commodities are studied: corn, wheat, soybeans, soybean oil, soybean meal, shell eggs, frozen pork bellies, live cattle, and Maine potatoes.

The Agricultural Situation in Eastern Europe: Production and Trade Statistics, 1970-75, Foreign Demand and Competition Division. FAER-117.

Through seven statistical tables, this publication pinpoints agricultural production and trade for Eastern Europe during 1970-75. The statistics are broken down by both country and major commodities.

Strategies for Balanced Rural-Urban Growth. Clark Edwards, Economic Development Division. AIB-392.

This publication summarizes the recently published *Alternative Futures for Nonmetropolitan Population, Income, and Capital* (AER-311). It highlights seven types of development strategies directed at achieving rural-urban economic balance by 1990.

Economic Trends

Item	Unit or Base Period	1967	1975 Year	1976 March	1976 Jan.	1976 Feb.	1976 March
Prices:							
Prices received by farmers	1967=100	—	181	165	186	187	184
Crops	1967=100	—	194	185	188	190	192
Livestock and products	1967=100	—	172	152	185	185	179
Prices paid, interest, taxes and wage rates	1967=100	—	185	179	193	193	194
Family living items	1967=100	—	177	173	183	183	184
Production items	1967=100	—	188	179	193	194	196
Ratio[1]	1967=100	—	98	92	96	97	95
Wholesale prices, all commodities	1967=100	—	174.9	170.4	179.4	179.4	179.8
Industrial commodities	1967=100	—	171.5	168.9	177.3	178.1	179.1
Farm products	1967=100	—	186.7	171.1	192.8	191.0	187.2
Processed foods and feeds	1967=100	—	182.6	177.3	179.4	176.4	175.8
Consumer price index, all items	1967=100	—	161.2	157.8	166.7	167.1	—
Food	1967=100	—	175.4	171.3	180.8	180.0	—
Farm Food Market Basket: [2]							
Retail cost	1967=100	—	173.6	168.5	178.5	176.9	—
Farm value	1967=100	—	186.9	171.5	185.8	184.1	—
Farm-retail spread	1967=100	—	165.3	166.6	173.9	172.3	—
Farmers' share of retail cost	Percent	—	42	39	40	40	—
Farm Income: [3]							
Volume of farm marketings	1967=100	—	115	89	120	93	—
Cash receipts from farm marketings	Million dollars	42,817	90,572	7,440	8,003	6,097	—
Crops	Million dollars	18,434	47,327	4,232	4,183	2,371	—
Livestock and products	Million dollars	24,383	43,245	3,208	3,820	3,726	—
Realized gross income [4]	Billion dollars	49.9	99.2	91.1	—	—	—
Farm production expenses [4]	Billion dollars	38.3	75.5	73.5	—	—	—
Realized net income [4]	Billion dollars	11.6	23.7	17.6	—	—	—
Agricultural Trade:							
Agricultural exports	Million dollars	—	21,894	1,911	1,994	1,715	—
Agricultural imports	Million dollars	—	9,295	749	218	769	—
Land Values:							
Average value per acre	Dollars	[6]168	[7]354	—	—	—	[8]381
Total value of farm real estate	Billion dollars	[6]181.9	[7]370	—	—	—	[8]398
Gross National Product: [4]	Billion dollars	796.3	1,498.8	1,433.6	—	—	—
Consumption	Billion dollars	490.4	963.8	926.4	—	—	—
Investment	Billion dollars	120.8	182.6	168.7	—	—	—
Government expenditures	Billion dollars	180.2	331.2	321.2	—	—	—
Net exports	Billion dollars	4.9	21.2	17.3	—	—	—
Income and Spending: [5]							
Personal income, annual rate	Billion dollars	626.6	1,245.9	1,203.2	1,315.0	1,327.9	—
Total retail sales, monthly rate	Million dollars	26,151	48,674	45,951	51,503	52,345	—
Retail sales of food group, monthly rate	Million dollars	5,759	10,970	10,805	11,348	11,200	—
Employment and Wages: [5]							
Total civilian employment	Millions	74.4	[9]84.8	[9]84.1	[9]86.2	[9]86.3	[9]86.7
Agricultural	Millions	3.8	[9]3.4	[9]3.3	[9]3.3	[9]3.2	[9]3.2
Rate of unemployment	Percent	3.8	8.5	8.5	7.8	7.6	7.5
Workweek in manufacturing	Hours	40.6	39.4	38.9	40.5	40.4	40.2
Hourly earnings in manufacturing, unadjusted	Dollars	2.83	4.81	4.72	5.02	5.04	5.07
Industrial Production: [5]	1967=100	—	114	110	120	120	—
Manufacturers' Shipments and Inventories: [5]							
Total shipments, monthly rate	Million dollars	46,449	82,724	77,635	89,276	90,959	—
Total inventories, book value end of month	Million dollars	84,655	146,574	151,194	147,030	147,204	—
Total new orders, monthly rate	Million dollars	46,763	81,351	74,175	88,190	90,371	—

[1]Ratio of index of prices received by farmers to index of prices paid, interest, taxes, and farm wage rates. [2]Average annual quantities of farm food products purchased by urban wage earner and clericalworker households (including those of single workers living alone) in 1959-61—estimated monthly. [3]As of November 1, 1975. [9]Beginning January 1972 data not strictly comparable with prior data because of adjustment to 1970 Census data.

Source: U.S. Dept. of Agriculture (Agricultural Prices, Foreign Agricultural Trade and Farm Real Estate Market Developments); U.S. Dept. of Commerce (Current Industrial Reports, Business News Reports, Monthly Retail Trade Report and Survey of Current Business); and U.S. Dept. of Labor (The Labor Force and Wholesale and Consumer Price Index.)

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